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The central focus of the research was the development of a unified theory for reasoning under uncertainty in knowledge base systems. In particular an effort was made to bring together the concepts of fuzziness, lack of specificity, randomness, and monotonicity, under one framework. A number of issues relating to this goal were investigated This effort resulted in 56 submitted papers of which 49 have been published and 7 are to appear in the near future.

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THE DEVELOPMENT OF STRUCTURE FOR THE REPRESENTATION AND MANIPULATION OF SOPHISTICATED KNOWLEDGE IN INTELLIGENT SYSTEMS

# Final Technical Report AFOSR Grant 87-0126


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Developed a new family of aggregation operators which allow for aggregations which lie between the *and* and *or*. Investigated their applicability to multi-criteria decision problems. [2]

Developed a reasoning mechanism for multivalued variables. This has applications in diagnostic environments in which multiple faults can exist. [3]

Suggested a representation of commonsense knowledge by in probabilistic framework based on the mathematical theory of evidence. This approach implements Zadeh's concept of usuality.[4]

Developed a formalism for representing monotonic knowledge in the Dempster-Shafer theory of evidence. [5]

An integer programming approach to the formulation of expert systems reasoning was developed.[6]

The integer programming approach was extended to allow for the inclusion of nonmonotonic knowledge. This was accomplished by providing for different weights associated with variable in the objective function. [6]

We suggested an approach to nonmonotonic reasoning which has the ability to handle situations in which their is partial matching of antecedents and default values. [9, 13]

We introduced a set theoretic framework for the representation of nonmonotonic knowledge. [9].

A schema was introduced for the representation of inheritance networks in which the the slot values can be sets values which can be defeasible or not. This system performs in both hierarchical and multi-path environments. [11]

The technique of constraint propagation was extended to environments in which the label sets and constraints are fuzzy. [12]

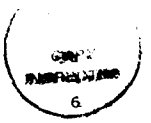
A methodology for multi-criteria decision making in cases in which the preference information is drawn from a scale that only has a linear ordering on it was introduced. [14]

We suggested a methodology for handling within the framework of the theory of approximate reasoning rules in which the antecedent conditions are specified as relations between variables. [15]

A new nonmonotonic set theoretic *and* operator was introduced. [18]

A representation for fuzzy set based production rules within the neural network paradigm was developed. [23]

A methodology for representing nonmonotonic knowledge in the neural network was suggested. [25]



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